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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/808,561

Applicant(s)

ZOHAR ET AL.

Examiner

MATTHEW BRADLEY

Art Unit

2187

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 May 2008.
2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-33 is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5) ☐ Claim(s) _____ is/are allowed.
6) ☒ Claim(s) 1-33 is/are rejected.
7) ☐ Claim(s) _____ is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
10) ☒ The drawing(s) filed on 24 March 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-8508)
4) ☐ Interview Summary (PTO-413)
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____
Paper No(s)/Mail Date _____

DETAILED ACTION

Response to Amendment

This Office Action has been issued in response to amendment filed 12 May 2008 in the form of a Request for Continued Examination. Applicant's arguments submitted 12 May 2008 have been carefully and fully considered, but are not found persuasive.

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 12 May 2008 has been entered.

Claim Status

Claims 1-33 remain pending and are ready for examination.

Drawings

The drawings are objected to under 37 CFR 1.83(a) because they fail to show "a processor in the cache" as described in the instantly amended specification beginning on page 16, line 23. Any structural detail that is essential for a proper understanding of the disclosed invention should be shown in the drawing. MPEP § 608.02(d). Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the

sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required: Previously amended independent claims **1, 14, 26, 28, 30, and 32** recite in part, caches -"configured to" or "adapted to"- "function" or "operate" – as controllers. Insofar as it appears to be clear, the Examiner is having difficulty locating *explicit or inherent* support in the specification for the caches operating as controllers as explained in further detail *infra*.

The amendment filed 12 May 2008 is objected to under 35 U.S.C. 132(a) because it introduces new matter into the disclosure. 35 U.S.C. 132(a) states that no amendment shall introduce new matter into the disclosure of the invention. The added

material which is not supported by the original disclosure is as follows: the instant amendment to the specification, found in the paragraph beginning at page 16, line 23: 'configured to run on a processor in the cache.' The specification as originally filed does not support the instant amendment. In Applicant's arguments filed 12 May 2008, page number 13, Applicant submits that *"the disclosure of the caches as including software inherently discloses the caches including a processor."* The Examiner respectfully disagrees. The Examiner does note as is well known in the art, that a cache may comprise software for a processor, but there is no requirement however, that a cache includes a processor for the processing of said software.

Applicant is required to cancel the new matter in the reply to this Office Action.

Claim Objections

Claim **27** is objected to because of the following informalities: dependent claim 27 depends on itself. Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims **1-33** are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Previously amended independent claims **1**,

14, 26, 28, 30, and 32 recite in part, caches -"configured to" or "adapted to"- "function" or "operate" – as controllers. Insofar as it appears to be clear, the Examiner is having difficulty locating explicit or inherent support in the specification for the caches operating as controllers. Referring back to Applicant's specification, page 16 line 23 to page 17 line 11, the following is found, 'caches 20 are coupled to interfaces 26 by any suitable fast coupling system known in the art, such as a bus or a switch, so that each interface is able to communicate with, and transfer data to and from, any cache. Herein the coupling between caches 20 and interfaces 26 is assumed, by way of example, to be by a first cross-point switch 14. Interfaces 26 operate substantially independently of each other. ***Caches 20 and interfaces 26 operate as a data transfer system 27, transferring data between hosts 52 and disks 12.***' At least as is shown in the specification, the caches themselves are not operating or functioning as controllers substantially independent of each other. It appears as though the interfaces, as recited in the specification, work with the caches to achieve the functionality of a controller, not the caches just of themselves.

Applicant's instant amendment to the specification, in that, each cache ... may also additionally comprise software configured to run on a processor in the cache, fails to supplement the above noted deficiency in that such amendment is **not** supported by the specification as originally filed.

Accordingly, claims 1, 14, 26, 28, 30, and 32 fail to comply with the written description requirement.

Any claim not specifically addressed is rejected to at least by virtue of its dependency.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-8, 12-21 and 25 are rejected under 35 U.S.C. 102(e) as being anticipated by Hicken et al. (US 2004/0153727).

With respect to claim 1, Hicken et al. disclose a method for managing a data storage system (**300 of Fig. 3; paragraph 0038, lines 4-10**), comprising:

- configuring a first cache (**339 of Fig. 3**) to perform at least one of the operations of retrieving data from and storing data at a first range of logical addresses (LAs) in a storage device (**paragraph 0038, lines 13-17; paragraph 0039, lines 7-10; paragraph 0041, lines 10-14; primary cache 333 of storage controller 370-1 is the cache for LA1, and secondary cache 339 is the redundant cache for LA1, and resides on storage controller 370-2**);
- configuring a second cache (**333 of Fig. 3**) to perform at least one of the operations of retrieving data from and storing data at the first range of LAs (**paragraph 0039, lines 5-7; paragraph 0041, lines 10-14**);

- configuring one or more third caches (**338 of Fig. 3**) to perform at least one of the operations of retrieving data from and storing data at a second range of LAs in the storage device the first, second, and third caches being implemented in three separate physical units comprising software and adapted to function as controllers substantially independently of each other; (**paragraph 0041, lines 14-17, the Examiner notes that as the caches store data, the caches store software as instantly claimed**);
- detecting an inability of the second cache to retrieve data from or store data at the first range of LAs (**paragraph 0042, lines 7-9; when the storage controller 370-1 fails, cache memory 339 fails as well**); and
- reconfiguring at least one the one or more third caches to perform at least one of the operations of retrieving data from and storing data at the first range of LAs in response to the inability while continuing to perform at least one of the operations of retrieving data from and storing data at the second range of LAs (**paragraph 0044**).

With respect to claim 2, Hicken et al. disclose the method according to claim 1, and comprising configuring one or more interfaces (**CPUs 331 and 336 of Fig. 3**) to receive input/output (IO) requests (**paragraph 0025, lines 4-6 [a distinct but almost identical embodiment]**; **paragraph 0039, lines 15-16**) from host processors (**310 of Fig. 3; paragraph 0038, lines 4-7**) directed to specified LAs (**paragraph 0025, lines 3-6**) and to direct all the IO requests to the caches which have been configured to perform

at least one of the operations of retrieving data from and storing data at the specified LAs (paragraph 0039, lines 15-16).

With respect to claim 3, Hicken et al. disclose the method according to claim 2, wherein the one or more interfaces comprise a mapping between the first and the second and the one or more third caches and the first and second ranges of the LAs (paragraph 0038, lines 13-17), and wherein the one or more interfaces are adapted to convert the IO requests to one or more requests and to direct the one or more requests to at least one of the first and the second and the one or more third caches in response to the mapping (paragraph 0025, lines 4-6; paragraph 0026, lines 1-2; the CPUs onboard the storage controllers receive storage requests from the host, and issue them to the caches), and wherein detecting the inability comprises generating a reconfigured mapping between the first and the one or more third caches and the first and second ranges of the LAs (paragraph 0042, lines 9-13), and directing the one or more requests to at least one of the first and the one or more third caches in response to the reconfigured mapping (paragraph 0042, lines 9-13).

With respect to claim 4, Hicken et al. disclose the method according to claim 1, wherein reconfiguring the at least one of the first cache and the one or more third caches comprises processing data in the first cache and the one or more third caches so as to restore the first cache and the one or more third caches to a state of full data redundancy (paragraph 0044, lines 15-24).

With respect to claim 5, Hicken et al. disclose the method according to claim 4, wherein processing the data comprises classifying data in the first cache into a plurality

of data groups (**paragraph 0043, lines 10-15; when the caches are flushed, only the dirty data is flushed, not the resident data, which shows the data was classified**).

With respect to claim 6, Hicken et al. disclose the method according to claim 5, wherein one of the data groups comprises dirty data, and wherein processing the data comprises storing the dirty data at the one or more third caches (**paragraph 0043, lines 10-15; dirty data is stored on the third cache 338**).

With respect to claim 7, Hicken et al. disclose the method according to claim 5, wherein one of the data groups comprises dirty data, and wherein processing the data comprises storing the dirty data at the storage device (**paragraph 0043, lines 10-15; dirty data is flushed to the storage units**).

With respect to claim 8, Hicken et al. disclose the method according to claim 1, wherein reconfiguring the at least one of the first cache and the one or more third caches comprises retaining an initial configuration of the first cache (**paragraph 0042, lines 9-13, lines 18-22; after the second cache 333 fails, the first cache 339 retains its initial configuration and is now used to address storage requests for LA1**).

With respect to claim 12, Hicken et al. disclose the method according to claim 1, and comprising providing a system manager (**host computer 310 and CPUs 331 and 336 of Fig. 3**) which is adapted to configure the first, second and one or more third caches (**paragraph 0025, lines 4-6; paragraph 0039, lines 15-16**), to detect the inability (**paragraph 0028, lines 1-4**), and to reconfigure the at least one of the first cache and the one or more third caches (**paragraph 0042, lines 9-13, lines 18-22**).

With respect to claim 13, Hicken et al. disclose the method according to claim 12, wherein providing the system manager comprises incorporating one or more manager processing units into at least one of the storage device, the first cache, the second cache, and the one or more third caches (**host computer 310 and CPUs 331 and 336 of Fig. 3**), and operating the one or more manager processing units in a cooperative manner (**paragraph 0040; all of the CPUs are connected and work together**).

With respect to claim 14, Hicken et al. disclose a data storage system, comprising:

- a storage device (**300 of Fig. 3; paragraph 0038, lines 4-10**) wherein data is stored at logical addresses (LAs);
- a first cache (**339 of Fig. 3**) which is configured to perform at least one of the operations of retrieving data from and storing data at a first range of LAs in the storage device (**paragraph 0038, lines 13-17; paragraph 0039, lines 7-10; paragraph 0041, lines 10-14; primary cache 333 of storage controller 370-1 is the cache for LA1, and secondary cache 339 is the redundant cache for LA1, and resides on storage controller 370-2**);
- a second cache (**333 of Fig. 3**) which is configured to perform at least one of the operations of retrieving data from and storing data at the first range of LAs (**paragraph 0039, lines 5-7; paragraph 0041, lines 10-14**);
- one or more third caches (**338 of Fig. 3**) which are configured to perform at least one of the operations of retrieving data from and storing data at a second range of LAs in the storage device the first, second, and third caches being

implemented in three separate physical units, comprising software, and adapted to function as controllers substantially independently of each other; (**paragraph 0041, lines 14-17, the Examiner notes that as the caches store data, the caches store software as instantly claimed**); and

- a system manager (**host computer 310 and CPUs 331 and 336 of Fig. 3**)
 - which is adapted to detect an inability of the second cache to retrieve data from or store data at the first range of LAs (**paragraph 0042, lines 7-9; when the storage controller 370-1 fails, cache memory 339 fails as well**), and
 - which reconfigures at least one the one or more third caches to perform at least one of the operations of retrieving data from and storing data at the first range of LAs in response to the inability while continuing to perform at least one of the operations of retrieving data from and storing data at the second range of LAs (**paragraph 0044**).

With respect to claim 15, Hicken et al. disclose the storage system according to claim 14, and comprising one or more interfaces (**CPUs 331 and 336 of Fig. 3**) which are configured to receive input/output (IO) requests (**paragraph 0025, lines 4-6 [a distinct but almost identical embodiment]; paragraph 0039, lines 15-16**) from host processors (**310 of Fig. 3; paragraph 0038, lines 4-7**) directed to specified LAs (**paragraph 0025, lines 3-6**) and to direct all the IO requests to the caches which have been configured to perform at least one of the operations of retrieving data from and storing data at the specified LAs (**paragraph 0039, lines 15-16**).

With respect to claim 16, Hicken et al. disclose the storage system according to claim 15, wherein the one or more interfaces comprise a mapping between the first and the second and the one or more third caches and the first and second ranges of the LAs **(paragraph 0038, lines 13-17)**, and wherein the one or more interfaces are adapted to convert the IO requests to one or more requests and to direct the one or more requests to at least one of the first and the second and the one or more third caches in response to the mapping **(paragraph 0025, lines 4-6; paragraph 0026, lines 1-2; the CPUs onboard the storage controllers receive storage requests from the host, and issue them to the caches)**, and wherein detecting the inability comprises the system manager generating a reconfigured mapping between the first and the one or more third caches and the first and second ranges of the LAs **(paragraph 0042, lines 9-13)**, and directing the one or more requests to at least one of the first and the one or more third caches in response to the reconfigured mapping **(paragraph 0042, lines 9-13)**.

With respect to claim 17, Hicken et al. disclose the storage system according to claim 14, wherein reconfiguring the at least one of the first cache and the one or more third caches comprises the first cache processing data therein and the one or more third caches processing data therein so as to restore the first cache and the one or more third caches to a state of full data redundancy **(paragraph 0044, lines 15-24)**.

With respect to claim 18, Hicken et al. disclose the storage system according to claim 17, wherein processing the data comprises classifying data in the first cache into a plurality of data groups **(paragraph 0043, lines 10-15; when the caches are**

flushed, only the dirty data is flushed, not the resident data, which shows the data was classified).

With respect to claim 19, Hicken et al. disclose the storage system according to claim 18, wherein one of the data groups comprises dirty data, and wherein processing the data comprises storing the dirty data at the one or more third caches (**paragraph 0043, lines 10-15; dirty data is stored on the third cache 338**).

With respect to claim 20, Hicken et al. disclose the storage system according to claim 5, wherein one of the data groups comprises dirty data, and wherein processing the data comprises storing the dirty data at the storage device (**paragraph 0043, lines 10-15; dirty data is flushed to the storage units**).

With respect to claim 21, Hicken et al. disclose the storage system according to claim 1, wherein reconfiguring the at least one of the first cache and the one or more third caches comprises retaining an initial configuration of the first cache (**paragraph 0042, lines 9-13, lines 18-22; after the second cache 333 fails, the first cache 339 retains its initial configuration and is now used to address storage requests for LA1**).

With respect to claim 25, Hicken et al. disclose the storage system according to claim 14, wherein the system manager comprises one or more manager processing units incorporating one or more manager processing units into at least one of the storage device, the first cache, the second cache, and the one or more third caches (**host computer 310 and CPUs 331 and 336 of Fig. 3**), and wherein the one or more

manager processing units operate in a cooperative manner (**paragraph 0040; all of the CPUs are connected and work together**).

Claims 26-33 are rejected under 35 U.S.C. 102(e) as being anticipated by Henry et al. (US 6,898,666).

With respect to claim 26, Henry et al. teach a storage system, comprising:

- one or more mass storage devices, coupled to store data at respective first ranges of logical addresses (LAs) (**Fig. 2; column 4, lines 10-23, lines 55-67**);
- a plurality of interim fast-access-time caches (**cache pools 1 and 2**), each of the plurality of interim fast-access-time caches comprising software (**the Examiner notes that as the caches store data, the caches store software as instantly claimed**) and configured to operate as controllers substantially independently of one another, each interim fast-access-time device being assigned a respective second range of the LAs (**column 5, lines 45-55**); and coupled to receive data from and provide data to the one or more -mass-storage devices having LAs within the respective second range (**column 4, lines 55-59**); and
- one or more interfaces, which are adapted to receive input/output (IO) requests from host processors directed to specified LAs and to direct all the requests to the interim fast-access-time cache to which the specified LAs are assigned (**column 2, lines 11-15; column 4, lines 64-67**).
- a further plurality of interim fast-access-time caches adapted to be configured to be assigned the respective second range of the LAs and coupled to receive data from and provide data to the one or more mass storage devices having LAs

within the respective second range when any interim fast-access-time cache fails
(paragraph 0044).

With respect to claim 27, Henry et al. teach the storage system according to claim 27, wherein the mass storage devices comprise one or more disks **(disks 1-5 of Fig. 2; column 5, lines 9-23).**

With respect to claim 28, Henry et al. teach a method for storing data, comprising:

- storing the data in one or mass storage devices having respective first ranges of logical addresses (LAs) **(Fig. 2; column 4, lines 10-23 & 55-67);**
- assigning to each of a plurality of interim-fast-access-time caches **(cache pools 1 and 2)**, a respective second range of the LAs, each of the plurality of interim fast-access-time caches comprising software configured to operate as controllers substantially independently of one another, **(each cache pool is assigned separate LBA ranges for the associated disks; column 5, lines 45-55, the Examiner notes that as the caches store data, the caches store software as instantly claimed);**
- coupling the plurality of interim-fast-access-time caches to receive data from and provide data to the one or more mass storage devices having LAs within the respective second range **(column 4, lines 55-59);**
- receiving input/output (IO) requests from host processors directed to specified LAs **(column 2, lines 11-15; column 4, lines 64-67);** and directing all the IO requests to the interim-fast-access-time cache to which the specified LAs are assigned **(column 2, lines 11-15; column 4, lines 64-67).**

- wherein a further interim fast-access-time cache is adapted to be configured to be assigned the respective second range of the LAs and coupled to receive data. from and provide data to the one or more mass storage devices having. LAs within the respective second range when any interim fast-access-time cache fails **(paragraph 0044).**

With respect to claim 29. Henry et al. teach the method according to claim 28, wherein the mass storage devices comprise one or more disks **(disks 1-5 of Fig. 2; column 5, lines 9-23).**

With respect to claim 30. Henry et al. teach a system for transferring data to and from one or more mass storage devices which store data at respective first ranges of logical addresses (LAs) **(Fig. 2; column 4, lines 10-23, lines 55-67)**, comprising:

- a plurality of interim fast-access-time caches **(cache pools 1 and 2)**, each of the plurality of interim fast-access-time caches comprising software **(the Examiner notes that as the caches store data, the caches store software as instantly claimed)** and configured to operate as controllers substantially independently of one another, each interim fast-access-time device being assigned a respective second range of the LAs **(column 5, lines 45-55)**; and coupled to receive data from and provide data to the one or more -mass-storage devices within the respective second range **(column 4, lines 55-59)**; and
- one or more interfaces, which are adapted to receive input/output (IO) requests from host processors directed to specified LAs and to direct all the requests to

the interim fast-access-time cache to which the specified LAs are assigned
(column 2, lines 11-15; column 4, lines 64-67).

- a further plurality of interim fast-access-time caches adapted to be configured to be assigned the respective second range of the LAs and coupled to receive data from and provide data to the one or more mass storage devices having LAs within the respective second range when any interim fast-access-time cache fails **(paragraph 0044).**

With respect to claim 31, Henry et al. teach the storage system according to claim 30, wherein the mass storage devices comprise one or more disks **(disks 1-5 of Fig. 2; column 5, lines 9-23).**

With respect to claim 32, Henry et al. teach a method for transferring data to and from one or more mass storage devices which store data at respective first ranges of logical addresses (LAs) **(Fig. 2; column 4, lines 10-23, lines 55-67),** comprising:

- assigning to each of a plurality of interim-fast-access-time caches **(cache pools 1 and 2),** each of the plurality of interim fast-access-time caches comprising software **(the Examiner notes that as the caches store data, the caches store software as instantly claimed)** and configured to operate as controllers substantially independently of one another, a respective second range of the LAs **(each cache pool is assigned separate LBA ranges for the associated disks; column 5, lines 45-55);**

- coupling the plurality of interim-fast-access-time caches to receive data from and provide data to the one or more mass storage devices having LAs within the respective second range (**column 4, lines 55-59**);
- receiving input/output (IO) requests from host processors directed to specified LAs (**column 2, lines 11-15; column 4, lines 64-67**); and
- directing all the IO requests to the interim-fast-access-time cache to which the specified LAs are assigned (**column 2, lines 11-15; column 4, lines 64-67**).
- wherein a further interim fast-access-time cache is adapted to be configured to be assigned the respective second range of the LAs and coupled to receive data. from and provide data to the one or more mass storage devices having. LAs within the respective second range when any interim fast-access-time cache fails (**paragraph 0044**).

With respect to claim 33, Henry et al. teach the method according to claim 28, wherein the mass storage devices comprise one or more disks (**disks 1-5 of Fig. 2; column 5, lines 9-23**).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 9-11 and 22-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hicken et al. (US 2004/0153727) in view of Karger et al. ("Consistent

Hashing and Random Trees: Distributed Caching Protocols for Relieving Hot Spots on the World Wide Web," by in the Proceedings of the 29th ACM Symposium on Theory of Computing, Pages 654-663).

With respect to claim 9, Hicken et al. disclose the method according to claim 1. Hicken et al. do not disclose the limitation wherein reconfiguring the at least one of the first cache and the one or more third caches comprises implementing a minimum redistribution of the first and the second ranges among the first cache and the one or more third caches.

However, Karger et al. disclose the limitation wherein reconfiguring the at least one of the first cache and the one or more third caches comprises implementing a minimum redistribution of the first and the second ranges among the first cache and the one or more third caches (**page 5, section 4, "Consistent Hashing"**).

Hicken et al. and Karger et al. are analogous art because they are from the same field of endeavor, namely data caching.

At the time of invention, it would have been obvious to a person of ordinary skill in the art to combine the minimum redistribution in the form of consistent hashing of Karger et al. with the data caching redundancy system of Hicken et al. The motivation for doing so would have been because to prevent requiring a central server to distribute a completely updated hash table to all the machines every time a new machine is added to the network (**page 2, column 2, paragraph 2 beginning with "Our second..."**).

Therefore, it would have been obvious to a person of ordinary skill in the art to combine Karger et al. with Hicken et al. for the benefit of a data caching system with consistent hashing to obtain the invention as specified in claim 9.

With respect to claim 10, Hicken et al. disclose the method according to claim 9. Hicken et al. do not disclose the limitation wherein implementing the minimum redistribution comprises redistributing the first and the second ranges using a consistent hashing function.

However, Karger et al. disclose the limitation wherein implementing the minimum redistribution comprises redistributing the first and the second ranges using a consistent hashing function (**page 5, section 4, “Consistent Hashing”**).

With respect to claim 11, Hicken et al. disclose the method according to claim 9. Hicken et al. do not disclose the limitation wherein redistribution comprises redistributing the first and the second ranges using a random number function.

However, Karger et al. disclose the limitation wherein redistribution comprises redistributing the first and the second ranges using a random number function (**page 2, column 1, paragraph 5, “Our first tool, *random cache trees*...”**).

With respect to claim 22, Hicken et al. disclose the storage system according to claim 14. Hicken et al. do not disclose the limitation wherein reconfiguring the at least one of the first cache and the one or more third caches comprises the system manager implementing a minimum redistribution of the first and the second ranges among the first cache and the one or more third caches.

However, Karger et al. disclose the limitation wherein reconfiguring the at least one of the first cache and the one or more third caches comprises the system manager implementing a minimum redistribution of the first and the second ranges among the first cache and the one or more third caches (**page 5, section 4, “Consistent Hashing”**).

With respect to claim 23, Hicken et al. disclose the storage system according to claim 22. Hicken et al. do not disclose the limitation wherein implementing the minimum redistribution comprises redistributing the first and the second ranges using a consistent hashing function.

However, Karger et al. disclose the limitation wherein implementing the minimum redistribution comprises redistributing the first and the second ranges using a consistent hashing function (**page 5, section 4, “Consistent Hashing”**).

With respect to claim 24, Hicken et al. disclose the storage system according to claim 22. Hicken et al. do not disclose the limitation wherein redistribution comprises redistributing the first and the second ranges using a random number function.

However, Karger et al. disclose the limitation wherein redistribution comprises redistributing the first and the second ranges using a random number function (**page 2, column 1, paragraph 5, “Our first tool, *random cache trees*...”**).

Response to Arguments

Applicant's remarks filed 12 May 2008 have been carefully and fully considered but they are not persuasive.

With respect to Applicant's argument located within the second paragraph of the first page of the instant remarks (numbered as page 13) and continuing through to the second paragraph of the second page of the instant remarks (numbered as page 14) which recites:

"Applicants submit that the disclosure of the caches as including software inherently discloses the caches including a processor ... The explicit disclosure that the caches may comprise software provides inherent disclosure that the caches include controllers. This inherent disclosure provides a basis for amending the specification to recite this function without introducing prohibited new matter, as required by the MPEP ... Applicants submit that the disclosure provides antecedent basis for the claimed subject matter. Therefore it is respectfully requested that the objections be withdrawn."

The Examiner respectfully disagrees. The Examiner wishes to incorporate by reference herein the comments made *supra* with respect to the objection to the specification under 35 U.S.C. 132(a).

With respect to Applicant's argument drawn to the 35 U.S.C. 112 1st paragraph rejection, the argument starting in the third paragraph of the second page of the instant remarks (numbered as page 14) and continuing through to the end of the first paragraph on the third page of the instant remarks (numbered as page 15) which recites:

"Based on the amendments to the claims discussed above, Applicants submit that the issues with the claims are resolved, and respectfully request that the rejection be withdrawn ... As is apparent from the quoted passage, the caches discussed in the specification include associated controllers for the purpose of reading and writing the data to the respective cache. Therefore, it is respectfully submitted that the claims as presented comply with the written description requirement."

The Examiner respectfully disagrees. The Examiner again wishes to note that the instant amendments do not resolve the 35 U.S.C. 112 1st paragraph rejection. Further, in the quoted passage of the specification by the Applicant, in which the Applicant

submits that, 'the caches include associated controllers for the purpose of reading and writing data to the respective cache' the Examiner again respectfully disagrees and notes that insofar as it appears to be clear, nowhere in the cited passage or the specification is there support for the caches to function as controllers let alone include controllers.

With respect to Applicant's argument located within the first full paragraph of the fourth page of the instant remarks (numbered as page 16) which recites:

"Applicants submit that the answer to that question in this instance is that the phrase "adapted to function as controllers substantially independently of each other" is a limitation on the recited caches in the method, and therefore is deserving of patentable weight. In fact, the limitation of a cache functioning as a controller distinguishes the instant claims from the cited prior art, and therefore the limiting effect of the language following the words "adapted to" is concrete and substantial."

The Examiner respectfully disagrees and notes that Applicant has not provided any evidence in support of such allegation. As per MPEP 2145, arguments of counsel cannot take the place of factually supported objective evidence. The language, 'adapted to' only recites a perceived capability but does not require that the cache explicitly perform such functionality.

With respect to Applicant's argument located within the first paragraph of the fifth page of the instant remarks (numbered as page 17) which recites:

"In stark contrast, in the instant application, the CPU in each of the caches can only work on the cache itself. Therefore Hicken does not disclose or suggest the first, second and third caches being implemented in three separate physical units and adapted to function as controllers substantially independently of each other."

The Examiner respectfully disagrees. Again, the language, 'adapted to' only recites a perceived capability but does not require that the cache explicitly perform such

functionality. Further, the Examiner incorporates by reference herein the comments made *supra* with respect to the 35 U.S.C. 112 1st paragraph rejections.

With respect to Applicant's argument located within the second paragraph of the sixth page of the instant remarks (numbered as page 18) which recites:

" Additionally, Hicken does not disclose or suggest the feature of the amended claims that the caches comprise software."

The Examiner respectfully disagrees. The Examiner incorporates by reference herein the comments made *supra* with respect to the 35 U.S.C. 112 1st paragraph rejections.

With respect to Applicant's argument located within the second full paragraph of the sixth page of the instant remarks (numbered as page 18) which recites in part:

" However, there is no disclosure relating to reconfiguring element 338 to perform the operations of retrieving data from and storing data at logical addresses which were previously serviced by element 333, which the Office Action asserts discloses the second cache. Nor is there any disclosure that element 338 in Hicken accepts these additional functions while continuing to perform at least one of the operations of retrieving data from and storing data at the second range of LAs, as claimed."

The Examiner respectfully disagrees. As noted in Hicken, paragraph 0044, the remaining failed over storage controller searches for an available (lone) storage controller with which to pair-off. The remaining failed over storage controller then pairs with a lone storage controller, creating a pair. The lone storage controller reconfigures its secondary cache that is presently functioning as a redundant cache to its primary cache to act as a 'third' cache as instantly claimed for the failed over storage controller, thus anticipating the instant limitations of a third cache. Furthermore, as taught throughout Hicken, for example in paragraph 0036, the flushing of the caches that is

done can be done at different times. That is, after reconfiguring, and before flushing, the cache memory continues to perform at least one of the operations, the storing operation, as instantly claimed.

With respect to Applicant's argument located within the paragraphs of the seventh page of the instant remarks (numbered as page 19) which recites in part:

" Henry fails to disclose or suggest the feature of a plurality of interim fast-access-time caches, configured to operate as controllers substantially independently of one another, as recited in claim 26 ... Applicants again assert that this does not disclose the cited feature of a plurality of interim fast-access-time caches in which each of the plurality of interim fast-access-time caches comprise software and are configured to operate as controllers substantially independently of one another ... As previously stated, there is no indication in Henry that the cache pools discussed therein are configured to operate as controllers substantially independently of one another, and therefore, claim 26 is allowable over Henry."

The Examiner respectfully disagrees. The Examiner incorporates by reference herein the comments made *supra* with respect to the 35 U.S.C. 112 1st paragraph rejections. Further, the Examiner notes that the language, 'configured to' only recites a perceived capability but does not require that the cache explicitly perform such functionality. Accordingly, the Examiner then notes that as Henry teaches cache pools, that Henry teaches the instant claim language of, *a plurality of interim fast-access-time caches in which each of the plurality of interim fast-access-time caches comprise software and are configured to operate as controllers substantially independently of one another.*

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew Bradley whose telephone number is (571) 272-8575. The examiner can normally be reached on 6:30-3:00 M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kevin Ellis can be reached on (571) 272-4205. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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/Kevin L Ellis/
Acting SPE of Art Unit 2187